

COMPLETE LISTING OF CLAIMS

1. (original) A protection circuit, comprising:
 - a transistor power estimation circuit;
 - a power estimate filtering circuit connected to the transistor power estimating circuit;
 - a transistor control circuit connected to the power estimate filtering circuit;
 - a transistor temperature adjustment circuit connected to the transistor power estimating circuit; and
 - a transistor maximum current limiting circuit connected to the transistor power estimating circuit.
2. (original) The circuit of claim 1, wherein the transistor power estimation circuit includes:
 - a transistor current sensing circuit;
 - a transistor voltage sensing circuit; and
 - a summing circuit connected to the transistor current and voltage sensing circuits.
3. (original) The circuit of claim 1, wherein the transistor power estimation circuit is a single slope power estimation circuit.

4. (original) The circuit of claim 1, wherein the transistor power estimation circuit is a two-slope power estimation circuit.
5. (currently amended) The circuit of claim 1, wherein the transistor power estimation circuit is a four-slope power estimation circuit connected to a reference voltage that falls between ground and a main power transistor rail voltage.
6. (currently amended) The circuit of claim 1, wherein the transistor power estimation circuit is a multi-slope power estimation circuit that includes a resistor diode network connected to a reference voltage that falls between ground and a main power transistor rail voltage.
7. (original) The circuit of claim 1, wherein the power estimate filtering circuit includes an averaging circuit.
8. (original) The circuit of claim 1, wherein the power estimate filtering circuit includes a transistor thermal equivalent circuit.
9. (original) The circuit of claim 1, wherein the power estimate filtering circuit includes a resistor capacitor network.
10. (original) The circuit of claim 1, wherein the transistor maximum current

limiting circuit includes a predetermined number of diodes and a resistor.

11. (original) The circuit of claim 1, wherein the transistor control circuit includes a transistor.

12. (currently amended) The circuit of claim 1, wherein the transistor temperature adjustment circuit includes a thermistor thermally coupled to a case of a power transistor.

13. (original) The circuit of claim 1, wherein the transistor temperature adjustment circuit is integrated into the transistor power estimation circuit.

14. (currently amended) The circuit of claim 1, wherein the transistor control circuit includes an optocoupler coupled to a power supply regulation circuit in a manner that causes a power supply voltage applied to a power transistor to be reduced when the optocoupler is triggered.

15. (original) A protection method, comprising the steps of:

generating a power estimate of power dissipated by a power transistor;

filtering the power estimate to eliminate any transient power estimates and to generate a filtered power estimate; and

comparing the filtered power estimate to a predetermined power limit

and, when the filtered power estimate exceeds the predetermined power limit, generating a power transistor control signal that causes the power transistor to reduce its power dissipation.

16. (original) The method of claim 15, further comprising the steps of adjusting the filtered power estimate so that it varies as a function of power transistor operating temperature.

17. (original) The method of claim 15, further comprising the steps of limiting current output by the power transistor to a predetermined maximum level.

18. (original) The method of claim 15, wherein the power transistor control signal causes the power transistor to reduce its power dissipation by reducing power supply voltage applied to the power transistor.

19. (original) The method of claim 15, wherein the power transistor control signal causes the power transistor to reduce its power dissipation by reducing base current flowing into the power transistor.

20. (original) The method of claim 15, wherein the power transistor control signal causes the power transistor to reduce its power dissipation by reducing power supply voltage applied to the power transistor and reducing base current flowing

into the power transistor.

21. (original) A method of estimating junction temperature of a transistor, comprising the steps of:

generating a piecewise linear approximation of the transistor's power dissipation;

varying the piecewise linear approximation as a function of transistor temperature; and

averaging the temperature varying, piecewise linear approximation to generate an estimate of transistor junction temperature.

22. (new) The protection circuit of claim 1, wherein the transistor temperature adjustment circuit is adapted to cause the transistor power estimation circuit to generate a power estimate that varies as a function of a temperature associated with a power transistor.

23. (new) The protection circuit of claim 1, wherein the transistor temperature adjustment circuit adapted to cause the transistor control circuit to generate a control signal that varies as a function of a temperature associated with a power transistor.